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PNEUMATIC INSTRUMENT FOR MONITORING THE SMOOTHNESS OF PAPER AND
CARDBOARD

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The invention relates to measurement technology that can be used for monitoring the smoothness of paper and cardboard.

There is a known pneumatic instrument for monitoring the smoothness of paper and cardboard that includes a polished plate with a hole, a clamp device for the sample, a vacuum chamber connected to the hole in the polished plate, a stop watch and switches [1].

Shortcomings of the known instrument are low accuracy because of inadequate design of the vacuum chamber.

The goal of the invention is an improvement of the accuracy of monitoring. This goal is achieved by the fact that the vacuum chamber is made with a movable wall fastened by means of a flexible diaphragm and having a strap and arm with a weight, and the switches are connected to the arm.

The instrument is shown schematically in the drawing.

The instrument consists of polished glass plate 1 with central hole, a clamp device formed by a rubber gasket 2, a clamp plate 3 that has a ball pivot, arm 4 and weight 5, vacuum chamber 6, one wall of which is mounted by means of flexible diaphragm 8 with the capability of moving strap 9, which is hinged to movable wall 7 and to arm 10, on which is affixed weight 11, switches 12, 13, and timing device 14. The center of gravity of arm 10 and weight 11 is arranged above the center of rotation. Plate 1 is fastened to one of the stationary walls of chamber 6 so that the hole in the plate and the hole in the chamber line up. The ball pivot of plate 3 provides self-positioning and uniform distribution of clamp pressure. Switches 12 and 13 can be mechanical, electronic, magnetic, etc.

The instrument works in the following way.

Arm 4 with weight 5 is turned counterclockwise, moving plate 3 with gasket 2 away from plate 1 and arm 4 is locked in this position. Arm 10 with weight 11 is rotated counterclockwise, and tie 9 is raised together with wall 7 until the wall reaches the upper wall of stationary chamber 6 and arm 10 is locked in this position. When this is done, the excess air is displaced from chamber 6 through the hole in plate 1 and the pressure in the chamber equalizes with atmospheric pressure. Then the sample to be tested is placed between plate 1 and gasket 2, arm 4 is returned to the starting position and under the effect of weight 5 gasket 2 provides uniform clamping of the sample to plate 1 at the specified pressure. Then arm 10 is released and under the effect of weight 11, it rotates clockwise, pulling wall 7 downward until the vacuum produced in the chamber is equal to the momentum created by weight 11. Under the effect of this reduction of pressure between the surfaces of the sample and polished plate 1 air is drawn into chamber 6, and the rate of this process is dependent on the vacuum in chamber 6 and the roughness of the surface of the sample. As the air is being drawn in, the rarefaction in the chamber does not decrease, but rather increases, since because wall 7 is being lowered, the capacity of chamber 6 increases and the momentum created by weight 11 also increases as it descends, since the center of gravity of the arm with the weight is situated above the center of rotation. Upon passing by switch 12 arm 10 acts on it and actuates the timing device 14, and as it passes by switch 13 it switches off timing device 14. The position of switches 12 and 13 is arranged so that the movement of arm 10 between them corresponds to a specified increase of capacity of chamber 6, and therefore the reading of time on timing device 14 characterizes the passage of a set volume of air into the chamber, i.e., it characterizes the smoothness of the tested sample. Since the flow of air initially takes place at a low rate and then at a gradually increasing rate, the accumulation of dust in the depressions in the surface of the sample takes place at a lower rate, which reduces the effect of this factor on the reading of time and increases the monitoring accuracy.

Claim

A pneumatic instrument for monitoring the smoothness of paper and cardboard, which includes a polished plate with a hole, a clamp device for the sample, a vacuum chamber connected to the hole of the polished plate, a timing device and switches, which is distinguished by the fact that, with the goal of improving the monitoring accuracy, the chamber is made with a movable wall affixed to it by a flexible diaphragm and having a strap and arm with a weight, and switches are connected to the arm.

Sources of information considered in examiner's evaluation:

1. Inventor's Certificate from Application No. 2652658.

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